Attitudes towards the surgical safety checklist and factors associated with its use : a global survey of frontline medical professionals

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Cross sectional study

Attitudes towards the surgical safety checklist and factors associated with its use: A global survey of frontline medical professionals☆

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HIGHLIGHTS

- This study suggests wide but variable use of the surgical safety checklist by frontline medical professionals.
- This variation in the use of the checklist is most apparent in low and middle income countries.
- Factors linked to individual's reluctance to were identified as attitudes to the usefulness of the checklist.
- Novel methodolgy using social media to perform a cross sectional observational study to survey opinions.

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ABSTRACT

Background: The Surgical Safety Checklist (SSC) has been shown to reduce perioperative errors and complications and its implementation is recommended by the World Health Organisation (WHO). However, it is unknown how widely this intervention is used. We investigated attitudes and factors associated with use of WHO SSC in frontline medical professionals across the globe using a survey distributed through social networks.

Methods: A survey of usage and opinions regarding the SSC was posted on the Facebook and Twitter pages of a not-for-profit surgical news website for one month (March 2013). Respondents were grouped into four groups based on their country's Gross National Income: high, upper middle, lower middle and low income. Univariate and multivariate analyses were performed to investigate how different factors were associated with the use of the SSC.

Results: 6269 medical professionals from 69 countries responded to the survey: most respondents were from lower middle (47.4%) countries, followed by: high (35.0%), upper middle (14.6%), and low (3.0%) income countries. In total, 57.5% reported that they used the WHO SSC perioperatively. Fewer respondents used the WHO SSC in upper middle, lower middle and low income countries (LMICs) compared to high income countries (43.5% vs. 83.5%, $p < 0.001$). Female (61.3% vs. 56.4% males, $p = 0.001$), consultant surgeons (59.6% vs. 53.2% interns, $p < 0.001$) and working in university hospitals (61.4% vs. 53.7% non-university hospitals, $p < 0.001$) were more likely to use the SSC. Believing the SSC was useful, did not work or caused delays was independently associated with the respondents reported use of the SSC (OR 1.22 95% CI 1.07–1.39; OR 0.47 95% CI 0.36–0.60; OR 0.64 95% CI 0.53–0.77, respectively).

Conclusion: This study suggests the use of the WHO SSC is variable across countries, especially in LMICs where it has the most potential to improve patient safety. Critical appraisal of the documented benefits of the WHO SSC may improve its adoption by those not currently using it.

☆ This work will be presented at the Association of Surgeons of Great Britain and Ireland International Surgical Congress 2014.

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1. Introduction

The World Health Organisation (WHO) "Safe Surgery Saves Lives" initiative aims to reduce perioperative errors and complications [1]. The implementation of a protocolised WHO Surgical Safety Checklist (SSC) has been central to this initiative. The WHO SSC corresponds to specific periods of any surgical procedure; these can be divided into the time of the induction of anaesthesia (sign in), the incision of the skin (time out), and the moment when the patient leaves the operating room (sign out). In each phase, the operative team completes a list of checks before it proceeding with the operation. There is growing evidence that the WHO SSC can reduce postoperative morbidity and mortality [2–5]; the benefits of which are most striking in low- and middle-income countries (LMICs) [2]. By 2012, over four thousand hospitals worldwide had registered with the WHO to be participating in the initiative. However, this may not reflect how widely the WHO SSC is used by frontline medical professionals.

The internet, social networking and social media platforms allow individuals, especially from LMICs, to share information and collaborate globally more effectively than ever before [6–9]. Approximately 1.5 billion people are registered users on social networking sites with 80% routinely using such sites across the globe [10]. There are growing numbers of medical professionals using sites including Facebook and Twitter [11]. Specific pages on these sites are maintained by medical organisations and associations to keep medical professionals up-to-date with links to continued medical education. Followers of these social media organisations provide a unique cohort to capture variations in practice across the globe.

The aim of this study was to investigate the use of the WHO SSC by frontline medical professionals across the globe and identify potential attitudes and barriers to its implementation using a survey distributed through social networks.

2. Methods

A short questionnaire was designed to determine proportion of frontline medical professionals who used the WHO SSC and attitudes towards its utility (Supplementary Table 1). Attitudes to the WHO SSC were assessed through four questions: (1) 'do you think the safety checklist is useful?'; (2) 'do you think the safety checklist prevents mistakes?'; (3) 'do you think the safety checklist causes delays?'; and (4) 'do you think the safety checklist doesn't work?'. The survey was tested on members of the Editorial board of the Schoolofsurgery.org, a not-for-profit surgical news website that offers free medical educational content to its worldwide followers. The content is written by surgical trainees from the Yorkshire School of Surgery, UK. An Editor-in-Chief and Editorial board maintains content and relevance.

Entries promoting the survey were uploaded to the Schoolofsurgery.org Facebook and Twitter pages during March 2013. The questionnaire could only be submitted if fully completed to prevent "missing data". In addition, multiple submissions from the same Internet Protocol address were blocked to avoid duplicate responses.

This study report was prepared according to guidelines set by the STROBE (strengthening the reporting of observational studies in epidemiology) statement for observational studies. Medical students were included in this analysis as in many countries they are important members of the surgical team and assist in the operating room [12]. Respondents were grouped as: medical student/intern, resident/trainee or attending/consultant. Respondents who identified themselves as nurses and other operating room practitioners were excluded from the analysis. The countries of practice of the respondents were grouped by their level of development as measured by Gross National annual Income (GNI) per capita as defined by the United Nations. Accordingly, countries were grouped into high income (>$12276), upper middle income ($3976–$12275), lower middle income ($1006-$3975) and low income (<$1005) [13]. Hospitals were divided by the respondents into: (1) university teaching hospital/trauma centre/level 3; urban hospital (>500 beds)/level 2; (2) district general hospital (<500 beds)/rural hospital/level 1; (3) government hospital; (4) single specialty hospital and (5) private (independent) hospital.

Use of the WHO SSC was considered 'routine' if a response of "most of the time" or "all the time" was given. Univariate analysis was performed to identify factors associated with the routine use of the WHO SSC using a X^2 test. Demographic variables (age, gender, level of training, type of hospital, size of economy by GNI per capita) and attitudes towards the WHO SSC (perceived usefulness, useful to prevent mistakes, caused operative delays or felt it did not work) were then used in a multivariable logistic regression analysis to determine the adjusted odd ratios (OR) and 95% confidence intervals (95% CI) for predictors of routine use of the WHO SSC using a forward stepwise variable selection procedure. All analyses were performed using SPSS version 21 (SPSS, Chicago, Illinois, USA). $P \leq 0.010$ was considered significant.

3. Results

A total of 14,243 people clicked on the link to the study page. Of these, 6462 (45.4%) completed the survey. A total of 6269 (97.0%) respondents identified themselves as medical students/interns, residents/trainees or attendings/consultants based in 69 countries and completed the survey. By the end of the study period, the Schoolofsurgery.org had 33,527 followers on Facebook and 801 on Twitter. Since 1641 individuals and groups shared the posts containing a link to the survey within their own social network the target population is unknown. Demographics of the respondents are shown in Table 1. The highest numbers of responses were from men, 25–35 year old, and working in university teaching hospitals and trauma centres. Respondents were mostly from lower middle (47.4%) and high (35.0%) income countries, followed by upper middle (14.6%), and low (3.0%) income countries. The highest

Table 1
General Demographics of Respondents (Values in parentheses are percentages).

	Total (%)
n	6269
Age	
18–24	1067 (17.0)
25–35	3058 (48.8)
36–45	1114 (17.8)
>46	1030 (16.4)
Males	4821 (76.9)
Profession	
Medical student/Intern	1733 (27.7)
Resident/Trainee	2319 (37.0)
Attending/Consultant	2217 (35.3)
Type of hospital	
University Teaching Hospital/Trauma centre/Level 3	3080 (49.1)
Urban hospital (>500 beds)/Level 2	749 (12.0)
District General Hospital (<500 beds)/Rural Hospital/Level 1	778 (12.4)
Government Hospital	898 (14.3)
Other	764 (12.2)
Economy by per capita GNI*	
High income	2196 (35.0)
Upper middle income	917 (14.6)
Lower middle income	2969 (47.4)
Low income	187 (3.0)

*Gross National Income.

numbers of respondents by country were from Egypt (10.8%), followed by India (9.2%), Pakistan (3.9%), Bangladesh (2.5%) and the UK (1.8%).

In total, only 57.5% reported routine use of the WHO SSC. Respondent's demographics and attitudes were compared between those who reported routine use of the WHO SSC and those who did not (Table 2). Fewer respondents routinely used an SSC in LMICs compared to in high income countries (43.5% vs. 83.5%, $p < 0.001$). Increasing age, female gender and seniority were associated with the routine use of a WHO SSC (Table 2). In addition, university teaching hospitals routinely used the WHO SSC more often than non-university teaching hospitals (61.4% vs. 53.7%, $p < 0.001$). Of respondents who did not routinely use the WHO SSC ($n = 2664$), 57.6%, and 60.7% stated that a check point before the first incision "time out" or at the end of surgery "sign out" was performed.

Although 4181 (66.7%) respondents believed the WHO SSC was useful and 4031 (64.3%) felt it prevented mistakes, 765 (12.2%) respondents thought that it caused delays and 389 (6.2%) did not believe it worked. Respondents who felt that the WHO SSC was useful used it more often than those who did not (60.8% vs. 51.0%, $p < 0.001$).

Adjusted odds ratios for the routine use of the WHO SSC are presented in Table 2. Increasing age, female gender, seniority and the type of hospital were independent predictors of usage of the WHO SSC. Respondents in low, lower middle and upper middle countries were significantly less likely to routinely use a WHO SSC compared to high income countries (OR 0.10, 95% CI 0.07–0.14; OR 0.10, 95% CI 0.08–0.12; OR 0.28, 95% CI 0.23–0.34, respectively). Respondents' attitudes towards the WHO SSC were strongly predictive of its use (Table 2). Believing the WHO SSC was useful was predictive of respondents routinely using it as compared to believing it was not useful (OR 1.22, 95% CI 1.07–1.39).

4. Discussion

Despite its adoption as an international initiative and the growing evidence supporting its use, this study suggests the WHO SSC use by frontline medical professionals is variable. Reported usage of the WHO SCC appears to be linked to increasing age/seniority, female gender and the type of hospital respondents worked in. Importantly, the WHO SCC reported use was lowest in LMICs, where the benefits of using it may be greatest. Perception of usefulness is the main factor associated with WHO SSC usage.

Seminal work by Haynes et al. in eight diverse hospitals from eight economically different cities showed a significant reduction in complications from 11.0% to 7.0% and death rates from 1.5% to 0.8% after introducing a WHO SSC [2]. This reduction was most pronounced in LMICs. Others have shown that the WHO SSC generates cost savings [14] and that a reduction in adverse events occurs in all countries regardless of surgical speciality [15–22].

Table 2
Demographic factors and respondents attitudes and the WHO SSC.

	% Use of an SSC	p value[b]	OR[c]	95%CI[e]	p value[d]
Age		<0.001			
18–24	46.7		1		
25–35	55.9		0.95	0.79, 1.14	0.557
36–45	60.7		1.11	0.86, 1.43	0.437
>46	70.1		1.94	1.47, 2.55	<0.001
Gender		0.001			
Males	56.4		0.86	0.75, 0.99	0.041
Females	61.3		1		
Profession		<0.001			
Medical student/intern	53.2		1		
Resident/trainee	58.7		1.09	0.92, 1.30	0.317
Attending/consultant	59.6		1.54	1.25, 1.89	<0.001
Type of hospital		<0.001			
University teaching hospital/Trauma centre/Level 3	61.4		1		
Urban hospital (>500 beds)/Level 2	55.1		0.56	0.46, 0.67	<0.001
District general hospital (<500 beds)/Rural hospital/Level 1	56.1		0.56	0.45, 0.68	<0.001
Government hospital	43.9		0.67	0.57, 0.79	<0.001
Other	51.3		0.72	0.60, 0.87	<0.001
Economy by per capita GNI[a]		<0.001			
High income	83.5		1		
Upper middle income	60.5		0.28	0.23, 0.34	<0.001
Lower middle income	38.4		0.10	0.08, 0.12	<0.001
Low income	41.2		0.10	0.07, 0.14	<0.001
Attitudes to the WHO SSC					
It is useful		<0.001			
Yes	60.8		1.22	1.07, 1.39	0.002
No	51.0		1		
It prevents mistakes		0.823			
Yes	57.4		1.29	0.89, 1.54	0.832
No	57.7		1		
It causes delays		0.090			
Yes	54.7		0.64	0.53, 0.77	<0.001
No	57.9		1		
It doesn't work		0.0226			
Yes	54.7		0.47	0.36, 0.60	<0.001
No	57.7		1		

[a] Gross National Income.
[b] Chi-squared test for comparison of proportions using the SSC.
[c] Adjusted Odds Ratios generated using.
[d] Forward stepwise logistic regression adjusted for all other confounding factors in the table (age, gender, profession, type of hospital, GNI per capita and attitudes to the WHO SSC).
[e] Confidence intervals.

However, there is growing conflicting evidence of the impact of the surgical safety checklist across different global healthcare systems [23,5]. Studies from Canada and the Netherlands suggest the WHO SSC are not associated with as significant reductions in operative mortality or complications in these countries [23,5]. There is no similar conflicting evidence from LMICs.

Significant proportions of frontline medical professionals in our study report not using the WHO SSC, most notably in LMICs. Our respondents have access to educational resources such as the Schoolofsurgery.org and other internet resources, therefore access to information about the WHO SSC is not likely to be a barrier. Despite repeated campaigns by the WHO and partner organisations, our findings would suggest there is a lack of awareness regarding the usefulness of the WHO SSC specifically in LMICs, non-university hospitals and junior members of the surgical team. Another explanation for the apparent disparity in the usage of the WHO SSC is linked to a lack of additional resources and changes to clinical systems that may be needed to secure compliance in particular in LMICs [24].

It should be noted that out of the respondents who did not routinely use the WHO SSC, 57.6%, and 60.7% stated they still had a check point or "time out" before skin incision and a "sign out" at the end of surgery. In addition, seniority and age appear to be independent factors associated with WHO SSC usage. This may be linked to previous qualitative findings that show local leadership and championing by senior staff is needed for successful implementation of the WHO SSC [24].

Central to our methodology was the use the social media platforms, Facebook and Twitter to perform this global cross sectional study. As of June 2013, Facebook and Twitter reported 1.15 billion and >500 million active monthly users. The theory behind the motivation for people to contribute to online communities is linked to anticipated reciprocity; increased recognition; and gain a sense of communion [25]. It could be hypothesised that these platforms could be utilised as cost-effective methods of disseminating important medical and surgical information such as the benefits of the WHO SSC to LMICs. To our knowledge this is the largest ever survey of frontline medical professionals utilising social media which appears to be a novel method of performing a worldwide 'snapshot' of practice. This allows contributions from a wide and diverse medical community varying in seniority, geographical area, and type of hospital amongst other factors.

There are clearly limitations and biases for any survey-based study and it is possible that using social media could contribute additional selection bias. We have attempted to calculate a response rate here based on the number of individuals who "clicked" on the link to the survey page (45.4%). However, as the entry was shared by other individuals and groups, the response rate as a proportion of the number of individuals who had access to the survey is unknown. Additionally, since multiple submissions from the same Internet Protocol address were blocked to prevent duplicate responses, this might have limited the access of responders from LMICs if computers were shared. Furthermore, it is acknowledged that the respondents represent an un-validated group. The content on the Schoolofsurgery.org social media platforms is entirely educational with links to the newest peer-reviewed evidence. No advertising or political content or opinion is offered. Thus, our respondents are likely to be interested or work within the surgical field and the results offer a reflection of their practice.

In conclusion, this study suggests a wide but variable use of the WHO SSC especially in LMICs. A major barrier identified in this study appears to be perception of its benefits. A strategy to improve education by integration of the benefits of the WHO SSC in both under- and post-graduate training programmes and identifying and supporting local champions in LMICs, maybe necessary to further improve patient safety during surgery.

Conflict of interest

Drs. Vohra, Cowley, Bhasin, Barakat and Gough are founders of the Schoolofsurgery.org - a free, social-media driven, not-for-profit, surgical news channel.

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Ethical approval

None required.

Author contribution

RSV and JBC participated in the conception, design, writing and editing of this study. NB, HB and MJG participated in the writing of the manuscript. RSV participated in the statistical analysis. RSV is the guarantor. All authors read and approved the final manuscript.

Guarantor

RSV is the guarantor.

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Not applicable.

Consent

Not applicable.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.amsu.2015.04.001.

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